Are Preoperative PHQ-9 Scores Predictive of Postoperative Outcomes Improvement Following Anterior Cervical Discectomy and Fusion?

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Disclosures

Nathaniel W. Jenkins, MS; James M. Parrish, MPH; Nadia Hrynewycz, BS; Thomas Brundage, BS; Joon Yoo, BA
Nothing to disclose

Kern Singh, MD

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Introduction

• The Patient Health Questionnaire-9 (PHQ-9)
  • widely used depression screening tool

• Preoperative depression & anxiety predict postop pain and physical impairments
Aims and Objectives

Purpose:

- Assess possible association between:
  - preoperative depression
    - quantified by PHQ-9,
  - postoperative improvement in pain and disability after an ACDF.
Methodology

- Prospectively-maintained registry, retrospective review

- **119 patients** that underwent:
  - Primary,
  - 1, 2, or 3 level
  - degenerative spondylolisthesis
Methodology

- Variables Analyzed
  - Patient Health-Questionnaire-9 (PHQ9),
  - Visual Analogue Scale (VAS) neck and arm pain,
  - Oswestry Disability Index (ODI),
  - 12-Item Short Form Physical Component Score (SF-12 PCS)

- Statistical Analyses
  - Pairwise comparisons
  - Linear regression
    - PRO scores analyzed
    - Among other PRO scores
  - MCID was compared
    - Chi-Squared analysis
**Results**

No statistically significant variables at baseline

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PHQ-9 &lt; 5 (N=51)</th>
<th>PHQ-9 ≥ 5 (N=68)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± SD)</td>
<td>51.3 ± 11.1</td>
<td>48.8 ± 8.8</td>
<td>0.204</td>
</tr>
<tr>
<td>Sex (n)</td>
<td></td>
<td></td>
<td>0.513</td>
</tr>
<tr>
<td>Female</td>
<td>41.2% (21)</td>
<td>35.3% (24)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>58.8% (30)</td>
<td>64.7% (44)</td>
<td></td>
</tr>
<tr>
<td>Diabetes Status (n)</td>
<td></td>
<td></td>
<td>0.811</td>
</tr>
<tr>
<td>Non-diabetic</td>
<td>88.2% (45)</td>
<td>86.8% (59)</td>
<td></td>
</tr>
<tr>
<td>Diabetic</td>
<td>11.8% (6)</td>
<td>13.2% (9)</td>
<td></td>
</tr>
<tr>
<td>Smoking Status (n)</td>
<td></td>
<td></td>
<td>0.496</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>88.2% (45)</td>
<td>83.8% (57)</td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>11.8% (6)</td>
<td>16.2% (11)</td>
<td></td>
</tr>
<tr>
<td>BMI Category (n)</td>
<td></td>
<td></td>
<td>0.380</td>
</tr>
<tr>
<td>Non-Obese (&lt;30 kg/m²)</td>
<td>64.7% (33)</td>
<td>56.7% (38)</td>
<td></td>
</tr>
<tr>
<td>Obese (≥30 kg/m²)</td>
<td>35.3% (18)</td>
<td>43.3% (29)</td>
<td></td>
</tr>
<tr>
<td>Insurance (n)</td>
<td></td>
<td></td>
<td>0.089</td>
</tr>
<tr>
<td>Non-Workers’ Compensation</td>
<td>76.5% (39)</td>
<td>61.8% (42)</td>
<td></td>
</tr>
<tr>
<td>Workers’ Compensation</td>
<td>23.5% (12)</td>
<td>38.2% (26)</td>
<td></td>
</tr>
<tr>
<td>Modified CCI (Mean ± SD)</td>
<td>0.9 ± 1.4</td>
<td>0.8 ± 1.3</td>
<td>0.550</td>
</tr>
</tbody>
</table>

SD = Standard Deviation; PHQ-9 = Patient Health Questionnaire-9; CCI = Charlson Comorbidity Index; BMI = Body Mass Index; WC = Work’s Compensation
51 patients had a preoperative PHQ-9 score <5
68 patients had a PHQ-9 score ≥5

Table 2. Perioperative characteristics by PHQ-9 score

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>PHQ-9 &lt; 5 (N=51)</th>
<th>PHQ-9 ≥ 5 (N=68)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Fusion Levels</td>
<td></td>
<td></td>
<td>0.437</td>
</tr>
<tr>
<td>1-Level</td>
<td>64.7% (33)</td>
<td>58.8% (40)</td>
<td></td>
</tr>
<tr>
<td>2-Level</td>
<td>25.5% (13)</td>
<td>35.3% (24)</td>
<td></td>
</tr>
<tr>
<td>3-Level</td>
<td>9.8% (5)</td>
<td>5.9% (4)</td>
<td></td>
</tr>
<tr>
<td>Operative Time (Mean ± SD, min)</td>
<td>51.5 ± 15.9</td>
<td>51.3 ± 14.4</td>
<td>0.946</td>
</tr>
<tr>
<td>Estimated Blood Loss (Mean ± SD, mL)</td>
<td>30.4 ± 13.5</td>
<td>27.9 ± 10.4</td>
<td>0.258</td>
</tr>
<tr>
<td>Length of Stay (Mean ± SD, hours)</td>
<td>11.4 ± 8.2</td>
<td>13.6 ± 15.3</td>
<td>0.401</td>
</tr>
<tr>
<td>Discharge Date (n)</td>
<td></td>
<td></td>
<td>0.065</td>
</tr>
<tr>
<td>POD 0</td>
<td>64.4% (29)</td>
<td>54.4% (31)</td>
<td></td>
</tr>
<tr>
<td>POD 1</td>
<td>24.4% (11)</td>
<td>14.0% (8)</td>
<td></td>
</tr>
<tr>
<td>POD 2</td>
<td>0% (0)</td>
<td>5.3% (3)</td>
<td></td>
</tr>
<tr>
<td>POD 3+</td>
<td>11.1% (5)</td>
<td>26.3% (15)</td>
<td></td>
</tr>
</tbody>
</table>

POD = Postoperative day; SD = Standard Deviation; PHQ-9 = Patient Health Questionnaire-9
Higher PHQ-9 =  
↑ preoperative NDI, VAS neck pain, and VAS arm pain scores  
↓ preoperative SF-12 PCS scores  
Same Scores at 1-year follow-up
Results

- **High PHQ-9 cohort:**
  - Greater percent achieved MCID for NDI

- **No differences in MCID achievement for:**
  - VAS neck pain
  - VAS arm pain
  - SF-12 PCS

### Table 4. Percent of patients who achieved minimum clinically important difference at 6 months postoperative

<table>
<thead>
<tr>
<th></th>
<th>PHQ-9 &lt; 5 (N=51)</th>
<th>PHQ-9 ≥ 5 (N=68)</th>
<th>( \dagger )p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDI (n)</td>
<td>33.3% (17)</td>
<td>52.9% (36)</td>
<td>0.033</td>
</tr>
<tr>
<td>VAS Neck (n)</td>
<td>56.9% (29)</td>
<td>63.2% (43)</td>
<td>0.482</td>
</tr>
<tr>
<td>VAS Arm (n)</td>
<td>43.1% (22)</td>
<td>51.5% (35)</td>
<td>0.368</td>
</tr>
<tr>
<td>SF-12 PCS (n)</td>
<td>94.1% (48)</td>
<td>94.1% (64)</td>
<td>1.000</td>
</tr>
</tbody>
</table>

PHQ-9 = Patient Health Questionnaire-9; VAS=Visual Analog Scale; NDI=Neck Disability Index; SF-12 PCS = Short Form-12 Physical Component Score
\( \dagger \)p-value calculated using Chi-square analysis
*Boldface indicate statistical significance
MCID values: NDI = -17.3, VAS Neck = -2.6, VAS Arm = -4.1, SF-12 PCS = 8.1 (Parker et al)
Discussion

- Patients with worse preoperative mental health:
  - Greater preoperative disability and pain
  - However, significant long-term improvements in PROs following ACDF
- Patients can expect to have similar 1-year follow-up clinical outcomes regardless of preoperative PHQ-9 score
REFERENCES


THANK YOU!

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